Bluetooth-GPS receiver

WBT-100

USER'S MANUAL

Ver 1.0 R2

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Part 1 Product introduction

Overview

- Light turns off when Blue tooth connection is off
- Blue light solid on when Blue tooth connection initiates
- Blue light blinks if Blue tooth connection succeeds

- Red color: GPS mode: Solid light shows location fixing incomplete Blink light shows location fixing completed
- Green color: Compass mode: Solid light shows North direction (The slower LED blinks, the farther it turns from North.)
- Orange color: In calibrating mode

- Red light blinks if battery power is low
- Red light solid on while charging
- Green light solid on after fully charged

- Temporarily press to change mode between GPS mode and Compass. While in calibrating, temporary press on this button makes system enter into Compass mode if calibrating succeeds. Otherwise (if calibration fails) system will enter GPS mode.
- Press and hold this to enter auto-calibrating mode

- Temporarily press this to turn on/off Bluetooth
- Press and hold this to turn power on/off

Part 2 Features

WBT-100 is the GSP receiver with internal antenna. iTrax 03 used in its core is high-tech component and is integrated with electronic compass to the effect of providing more accurate GPS data(this innovative concept is patented by Wintec) especially during navigation when the vehicle is moving slowly.

It can also auto-log record of journey, which are useful in navigation, security tracking purpose, map making and other agricultural needs. USB connector ensures easy linking with other electronic devices.The GPS acquisition status, the last record of time and position can all be stored in unfailing memory. It has 12 GPS channels and its low power-consumption can last continuous 9 hours of operation. WBT-100 can boast of its smallest size ever with fullest features in the world.

- WBT-100 uses iTrax 03 GPS module (the 3rd generation) and the high-performance CPU (ARM7TDMI CPU)
- Maximum 12 channels can be acquisitioned quickly
- Internal decode"WAAS/EGNOS" is used excluding the need for external hardware in receiving WAAS/EGNOS signal
- System supports NMEA0183 3.0 for data transfer
- Internal electronic compass is used to get the compass/GPS inter-calibrating effect
- Electronic compass can work independently to find north
- With the integral support of electronic compass, NMEA data output can make navigation more reliable
- Data-logging acts like the in-flight black box and can record of position, date and time as long as power source is maintained
- For down-load of log-data and programming of WBT-100, provided software tool "G-tool" can simplify usage
- The system is upgradeable with new software which is provided free from us
- It is designed to be water-proof
- Data link thru blue tooth within 10 meter range
- Versatile design aimed for car/personal navigation, fleet management, AVL, tracking and mapping purpose

Part 3 Technical specifications

- General specs
  - Chips:u-Nav + iTrax 3rd generation of least power consumption with highest sensitivity
  - Number of channels:Receivable of signal from 12 satellites simultaneously
  - Receiving freq.:1575.42 MHZ
  - Receiving code:L1, C/A code
  - Sensitivity:-152dBm

- Positioning time (average)
  - Re-acquisition time: 0.1 sec
  - Quick Start: < 3 sec(within 25 min from last signal)
  - Cold start time:40 sec
  - Warm start time :38 sec
  - Hot start time : 8 sec
  - Data update automatically in every sec

- Accuracy
  - GPS acquisition in general: Accuracy range 25 meters (dependant on surroundings)
  - Supportive GPS features: Accessible to EGNOS/WAAS
  - Position error:
  - < 3 meter when 3D error is at 95%
  - < 6 meter when 2D vertical error is 95%
  - Speed: error within 0.2 meter per sec
  - Acceleration: Maximum 4G (G is gravity unit)
  - Time:20ns

- Size
  - Integral parts: Receiving module, blue tooth, rechargeable Li-Ion battery, internal high sensitive antenna
  - Measurement (L) 60.0 x (W)38.0 x (H)16.0 mm

- Battery performance
  - Charging voltage:+3.75~+5.5V DC
  - Internal Li-Ion rechargeable battery
  - 9 continuous working hours after fully charged

- Environmental specs
  - Working temp range:-10~70(internal temp)
  - Storage temp range:-40~85

- Bluetooth interface
  - Version: 1.1
  - Data output rate: Class 2
  - Data transmission range:5□10 meter(depends on environment)
  - Freq range: 2402~2480MHz
  - Receiving sensitivity:-80dBm
  - Power consumption :< 45mA (depends on data transfer)
  - Service: SPP SLAVE

- USB specs
  - Interface type::Standard USB connector of computer
  - Data transfer rate:9600bps□

- Data output:
  - GPS internal standard axis WGS84
  - NMEA-183 Version 3.0. ASCII output
    - GPRMC (default)
    - GPGSV (default)
    - GPGSA (default)
    - GPGGA (default)
    - GPGLL
    - GPVTG
    - GPZDA

Part 4 Safety Notes

- GPS (Global Positioning System) is provided by the United States government. Its accuracy may varies depending on special conditions (area at war or if it is blocked). Any control by USA will affect this system and its accuracy.
- If installed on the transportation device, driver must not operate this while driving
- GPS performance is effected when satellite coverage is degraded as near a high-rise building, in the tunnel or under a cover
- Personal replacement of components and re-structuring of this is prohibited and may result in loss of legal usage
- Operation of this device is strictly prohibited in highly explosive environment such mining ,in-flight or other unauthorized area against use of this
- Avoid exposing this at places of high temperature and humidity
- Return to original dealer immediately if it emits strange smell or fume

Part 5 Quick use guide

- Package :WBT-100(blue tooth GPS logger)+USB cable+ sticker car cigarette lighter power adaptor , installation Disk, Quick use guide

- WBT-100 Operation
  - Temporarily press power button to turn it on. The blue tooth and GPS status led will glow to confirm it is in GPS mode
  - GPS Led glows red to show GPS acquisition is done (1 Hz). But if this led is solid on, the GPS acquisition fails.
  - Temporarily press on power button. Blue tooth will turn off after blue tooth led goes off. Another press on power button can turn blue tooth on after its LED glows again.
  - Temporarily press on mode button each time can switch between compass mode (LED glows green) and GPS mode (LED glows red)
  - It is strongly recommended to have WBT-100 calibrated in any environment ahead of use. Press and hold the mode button to enter into calibration status which is displayed by orange LED. Press shortly again the same button to get out of calibration status and remain in compass mode (LED glows green). But if calibration fails, it will jump into GPS mode (LED glows red in this situation)
  - After power on, press and hold power button to turn the power off.
  - If red LED starts to blink, the power is low and needs recharging. Led stays solid while charging .It glows green after it is fully charged.

- When the USB is used as interface:-
  - USB driver must be installed first
  - After connection to USB port of computer, place the WBT-100 suitable area where it can best receive GPS signal for acquisitioning
  - Power it(or switch its power on)
  - WBT-100 will start acquisition

- When the blue tooth is used as interface:-
  - Ahead of blue tooth connection, make sure the target device to pair can support blue tooth SPP master
  - After pairing with WBT 100, place it at suitable area where it can best receive GPS signal for acquisitioning
  - Activate the software of paired device. WTB 100 starts to provide GPS data

- Battery charging
  - Connect WBT 100 with USB cable and turn on power source
  - To charge it , power source can be supplied from USB host from computer, or from power adapter or car cigarette lighter adapter

Part 6 Operation notes

- WBT 100 will do self-check once it is powered. Blue tooth and GPS start to work when both blue and red LED turns on. GPS automatically starts acquisition and auto-logs. If sky is clear overhead, it requires only 40 sec for acquisition. (If the data in its memory is still valid, it needs only 8~35 sec). After acquisition, WBT100 starts output data of position, speed and time in NMWA0183 format.

- For the first time if it is placed at the area well exposed to the satellite signal, this device requires approx 13 min (theoretically 12.5 min) to receive or update Almanac. Refer to trouble shooting guide when signal is not received well.

- If WBT-100 formatting the internal data is not correct, or if satellite data has been deleted, it takes longer time to position. But under the following conditions, it can take even longer time to do cold start.
  - If it is not in use for over 3 months (the almanac to too old)
  - If the recorded data is over 500 km

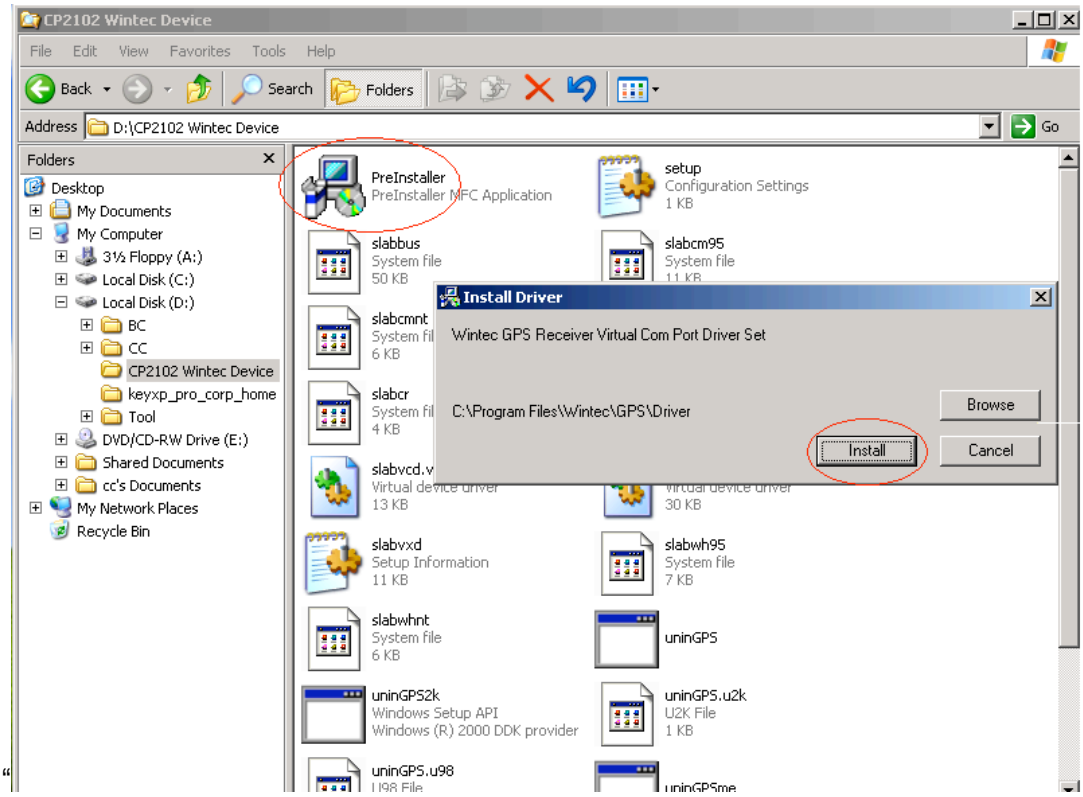
- After positioning, WBT-100 transfers navigation data thru export interface as below.
  - Latitude
  - Longitude
  - Altitude
  - Speed
  - Date
  - Time(UTC time)
  - Estimated error
  - Satellite status
  - Receiving status

- After positioning, if auto-log is activated, WBT 100 begins to auto-log the following way.
  - Maximum data up to 12680
  - Recording in a circular way
  - Auto-logging goes on without the need of any device
  - Log-data can be read out using the G-tool software included
  - Data can be read out thru USB or bluetooth
  - Data includes latitude, longitude, time in year-month-date-min-sec

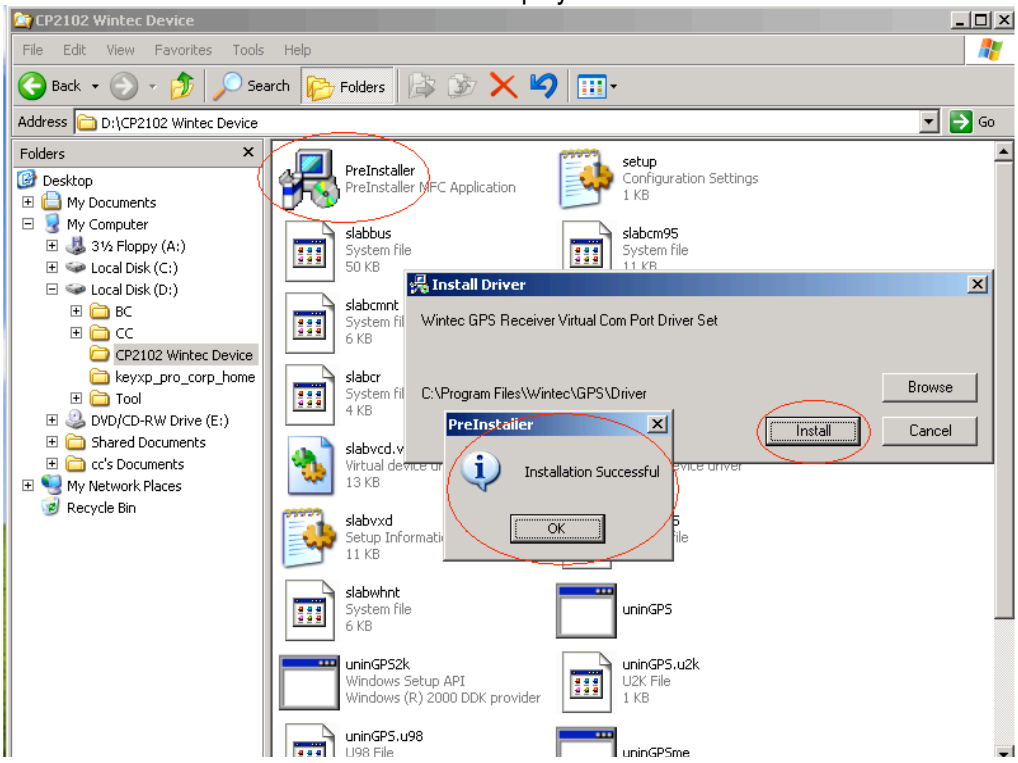
  - After successful positioning, it wills automatically auto-log GPS data into its internal memory chip. Use G-tool to program log interval (1~ 3600 sec). The factory default is set at 5 sec interval for the auto-logging. If interval is set to 0 sec, this auto-log feature is deactivated. Log data is recorded in a rotational order. The earliest (oldest) data will replaced by the latest (newest) one when memory space is full (when data excesses 12680 maximum).
  - Auto-log will continue even if the Bluethooth is off.
  - If interval 0 sec is set, auto-log stops to work. Its power will be off after 10 min the Bluetooth is switched off. Auto-log will not shut down if interval is set higher-than 0 sec.

Part 7 USB Driver Installation Guide

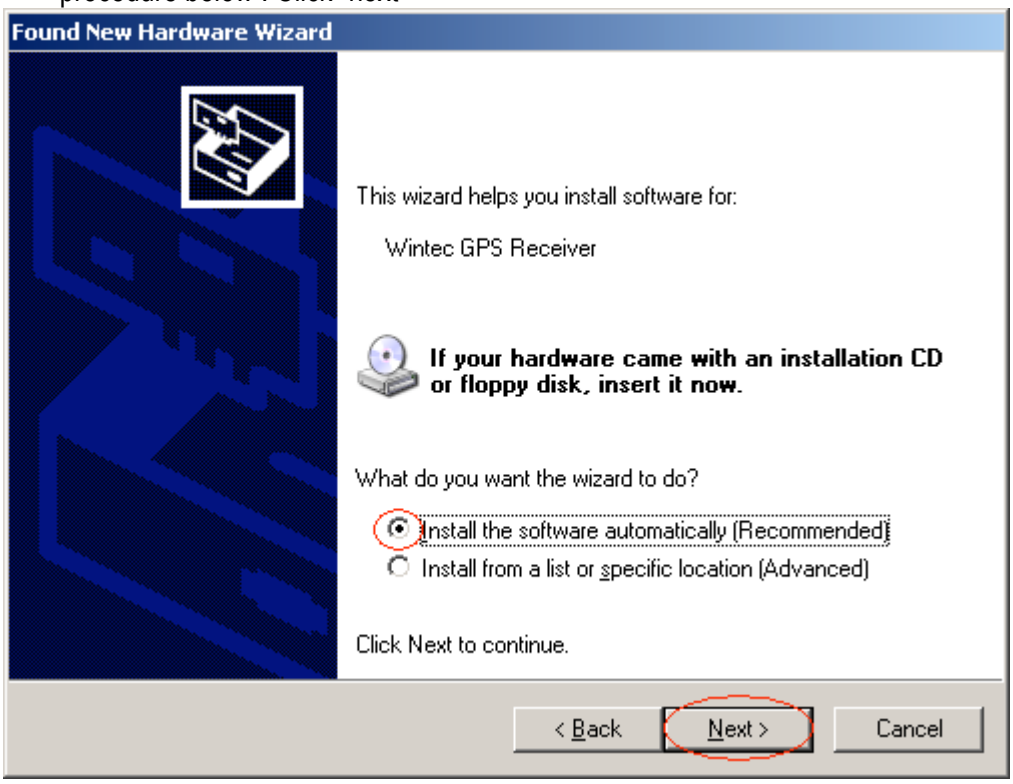
1 Execute installation and click “Install”.



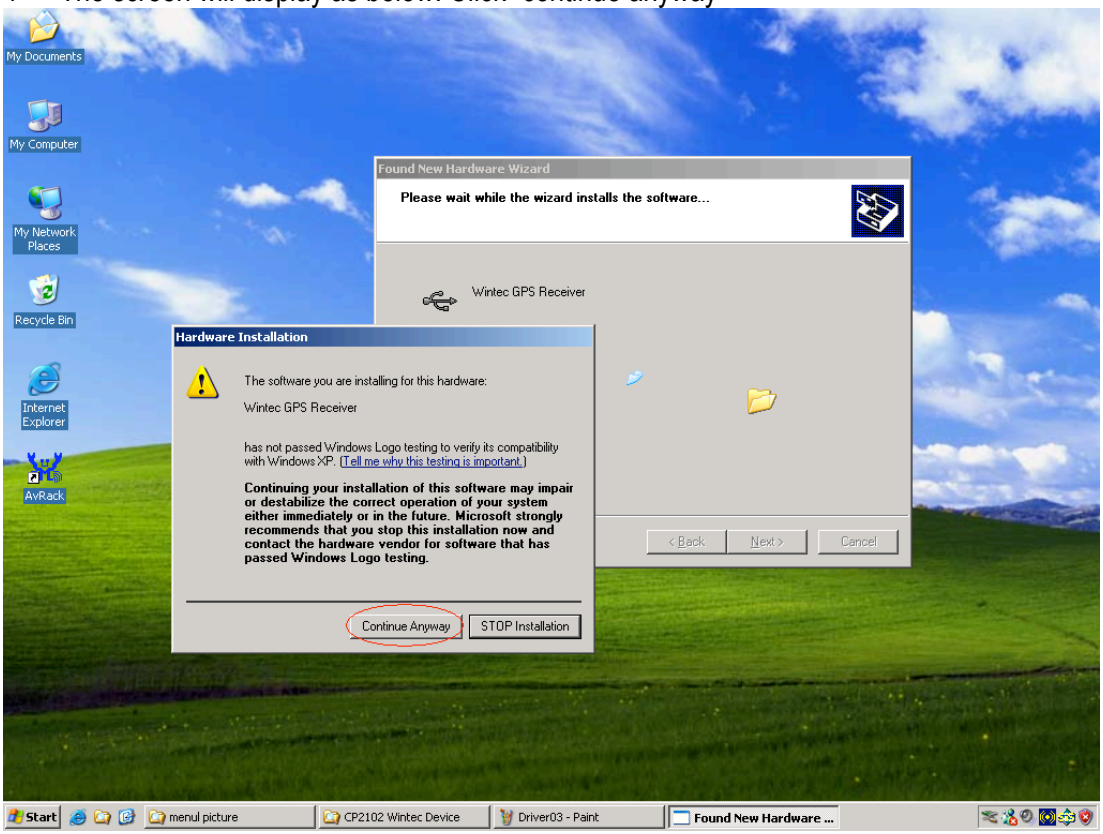
2 Installation is done when this screen displays.



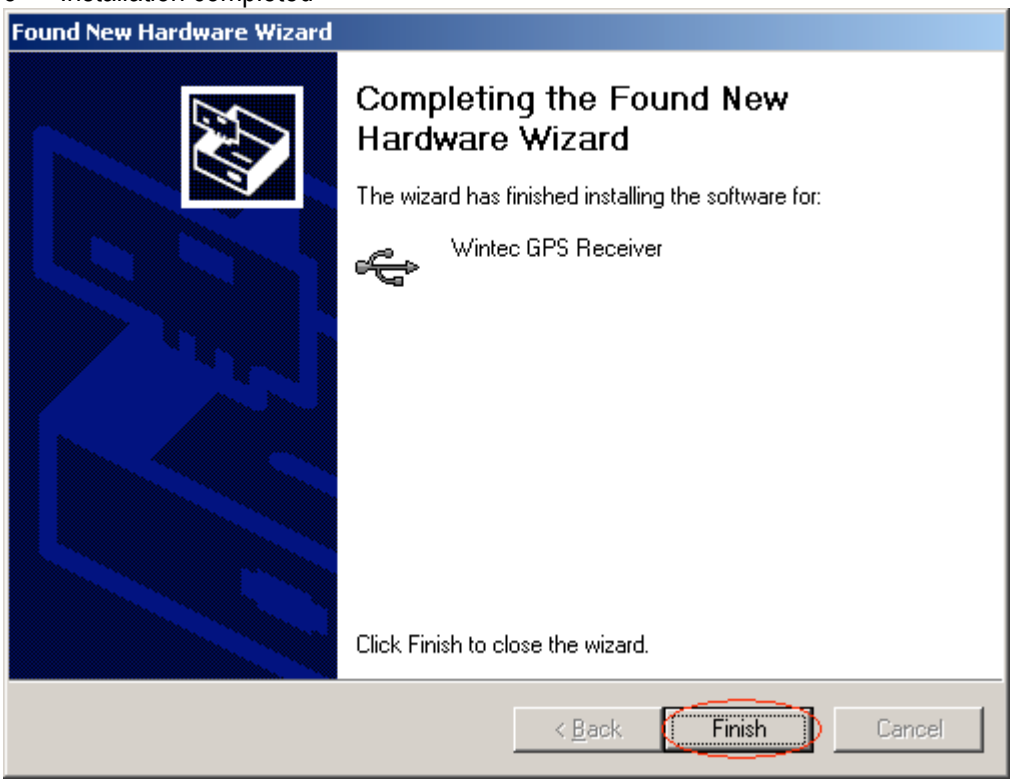
3 Use USB cord to connect WBT-100 to the USB port of computer. Computer will automatically check it and seek driver software by itself. If PC asks for " device manager" for adding the new USB device following USB device connection, take the procedure below . Click "next"


Found New Hardware Wizard
This wizard helps you install software for:
Wintec GPS Receiver
If your hardware came with an installation CD or floppy disk, insert it now.
What do you want the wizard to do?
Install the software automatically (Recommended)
Install from a list or specific location (Advanced)
Click Next to continue.
< Back
Next >
Cancel

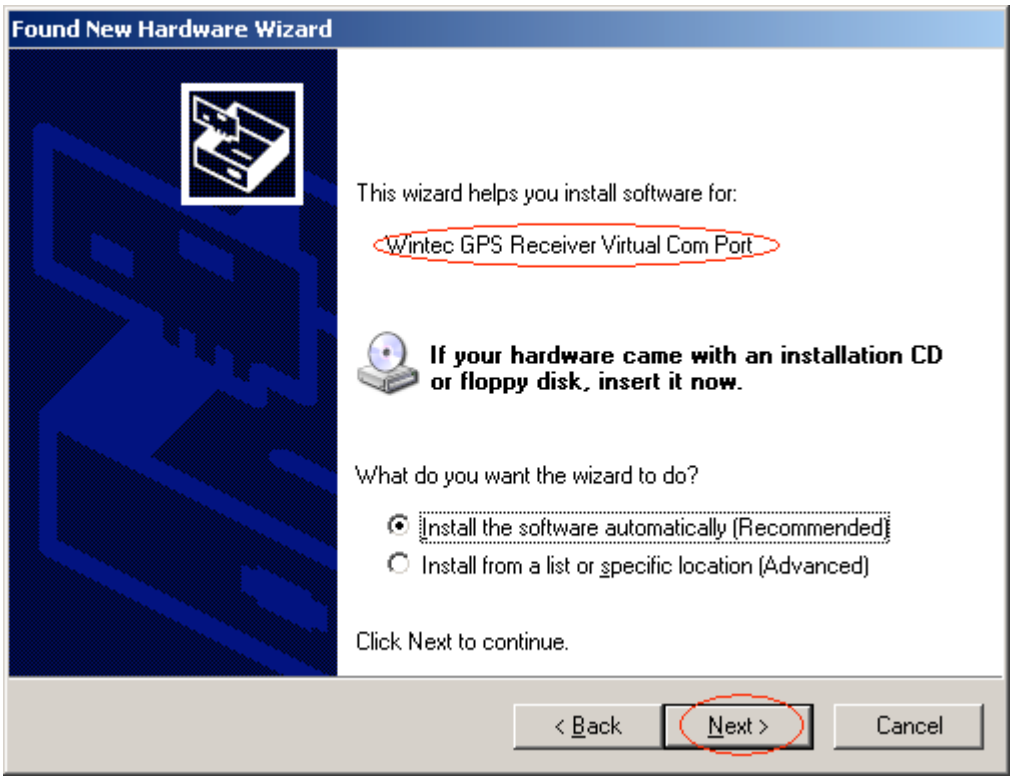
4 The screen will display as below. Click "continue anyway"


My Documents
My Computer
My Network Places
Recycle Bin
Internet Explorer
AvRack
Found New Hardware Wizard
Please wait while the wizard installs the software...
Wintec GPS Receiver
Hardware Installation
The software you are installing for this hardware:
Wintec GPS Receiver
has not passed Windows Logo testing to verify its compatibility with Windows XP. (Tell me why this testing is important.)
Continuing your installation of this software may impair or destabilize the correct operation of your system either immediately or in the future. Microsoft strongly recommends that you stop this installation now and contact the hardware vendor for software that has passed Windows Logo testing.
Continue Anyway
STOP Installation
< Back
Next >
Cancel
Start
menul picture
CP2102 Wintec Device
Driver03 - Paint
Found New Hardware ...

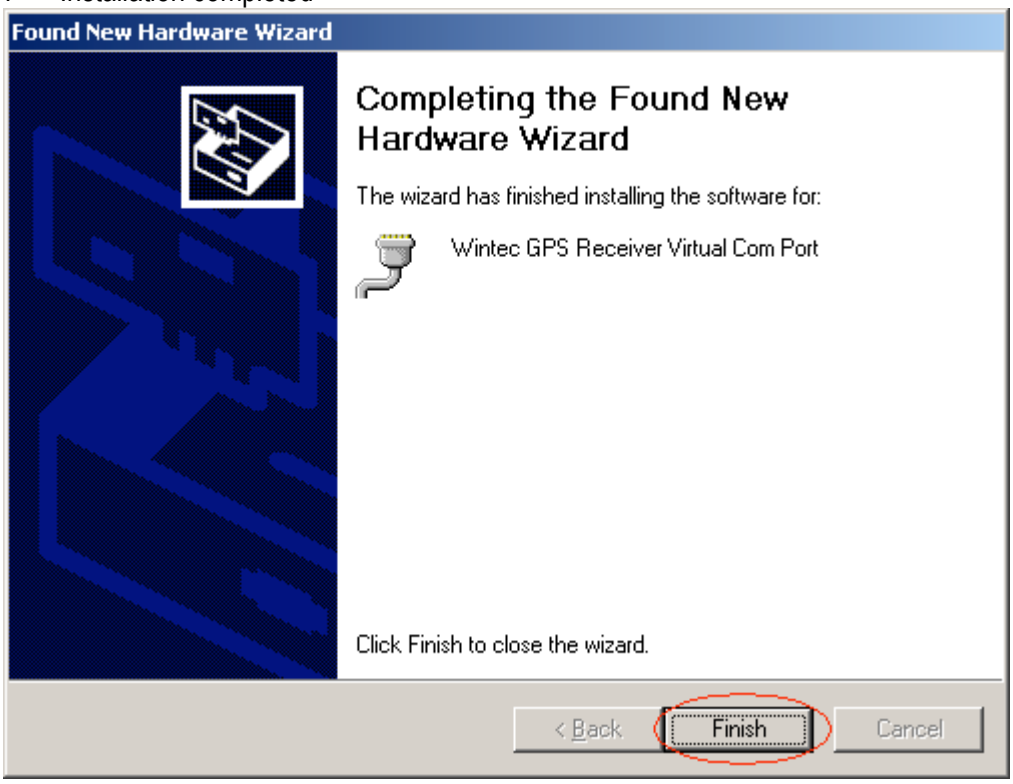
5 Installation completed



6 Immediately afterwards, PC will ask again to install “Wintec GPS Receiver Virtual Com Port” driver. Click “ next’

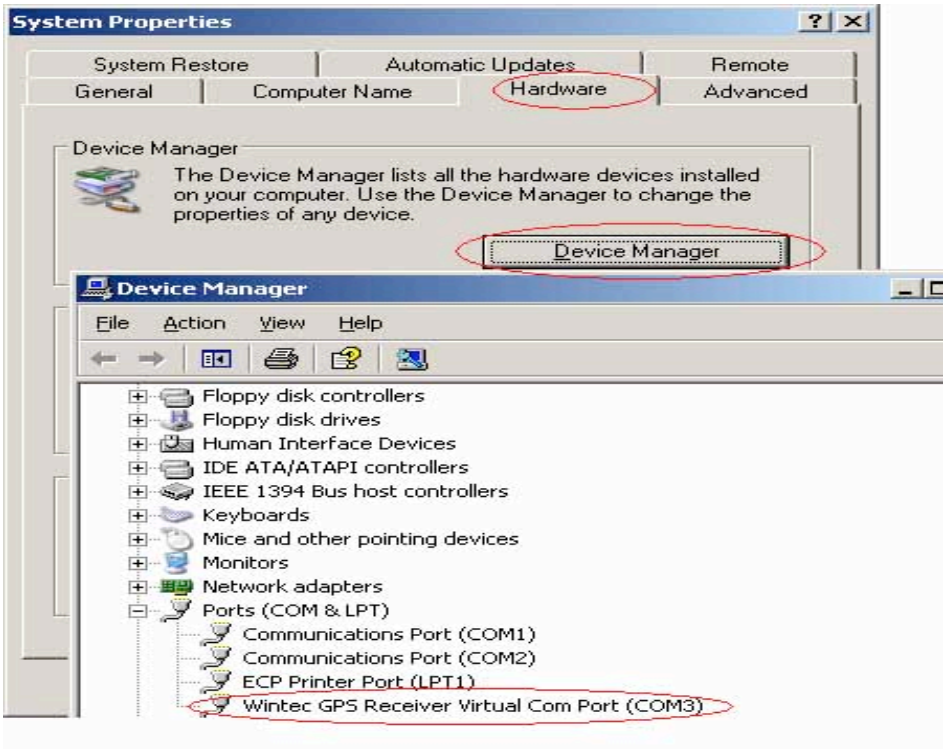

Found New Hardware Wizard
This wizard helps you install software for:
Wintec GPS Receiver Virtual Com Port
If your hardware came with an installation CD or floppy disk, insert it now.
What do you want the wizard to do?
Install the software automatically (Recommended)
Install from a list or specific location (Advanced)
Click Next to continue.
< Back
Next >
Cancel

7 Installation completed


Found New Hardware Wizard
Completing the Found New Hardware Wizard
The wizard has finished installing the software for:
Wintec GPS Receiver Virtual Com Port
Click Finish to close the wizard.
< Back
Finish
Cancel

To check the installation status, go to the “device manager”

8 As in the illustration, the USB device(marked in red circle) is correctly installed to PC.The illustration also shows USB being transfered to Com Port assigned as COM 3. In the future, whenever the USB device is connected to USB port on the computer, the COM 3 acts as the interface for data communication.



Part 8 Software interface

- WBT-100 Software Interface output asbelow.
- NMEA ((National Marine Electronics Association) 0183 Version 3.0 (ASCII Format)
- Baud Rate: 9600 bps, 8(Data Bits), Stop bit, No parity

- WBT 100 Factory Setting

Function	describe
Communication data and setting	
????Support Format	GPRMC, GPGSV, GPGSA, GPGLL, GPGGA, GPVTG, GPZDA
Default	GPRMC, GPGSV, GPGSA, GPGGA
baud rate	9600 bps
Receiver mode status	
GPS	GPS data will be auto-logged according to the interval. If interval is programmed to “0”, auto log features is deactivated. Bluetooth will turn off after 10 min from deactivation of auto-log for the power saving purpose.
Electronic compass	Under compass mode, north direction can easily be found. If used is a new surrounding, re-calibrate again for accuracy
Bluetooth	After Bluetooth connection is initiated but connection is not established in 5 min, WBT-100 will automatically turn off for the power saving purpose. If Bluetooth reconnection is needed again , just momentarily press “power” button one time.
Auto-log features	
Auto log interval at default	5sec
Auto log interval	1~3600 Sec.(0 is diableLog)
Maximum log data	12680

NMEA-0183 export data

NMEA	Explanation
GPGGA (factory default)	GPS Data
GPGSA(factory default)	GNSS DOP
GPGSV (factory default)	GNSS number of satellites
GPRMC (factory default)	Recommended minimum specific GPS data
GPGLL	Geologic position latitude/ longitude
GPVTG	Course Over ground and ground speed
GPZDA	Date and time

$GPGGA,hhmmss.dd,xxmm.dddd,<N|S>,yyymm.dddd,<E|W>,v,ss,d.d,h.h,M,g.g,M,a.a,xxxx*hh<CR><LF>

hhmmss.dd	UTC time of the fix. hh = hours. mm = minutes. ss = seconds. dd = decimal part of seconds.
xxmm.dddd	Latitude coordinate. xx = degrees. mm = minutes. dddd = decimal part of minutes.
<N/S>	Character denothing either N = North or S =South.
yyymm.dddd	Longitude coordinate. yyy = degrees. mm = minutes. dddd = decimal part of minutes.
<E/W>	Character denothing either E = East or W = West.
v	Fix valid indicator 0 = Fix not valid 1 = Fix is valid
ss	Number of satellites used in position fix, 00-12. Notice: Fixed length field of two letters.
d.d	HDOP – Horizontal Dilution Of Precision.
h.h	Altitude (mean-sea-level, geoid)
M	Letter M.
g.g	Difference between the WGS-84 reference ellipsoid surface and the mean-sea-level altitude.
M	Letter M.
a.a	NULL (not implemented)
xxxx	NULL (not implemented)
*hh	Check sum
<CR><LF>	End

Ex:$GPGGA,084053.39,6016.3051,N,02458.3735,E,0,00,0.0,46.6,M,18.2,M,,*5D

$GPGSA,a,b,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,p.p,h.h,v.v*hh<CR><LF>

a	Mode: M = Manual, forced to operate in 2D or 3D mode. A = Automatic, allowed to automatically switch 2D/3D.
b	Mode: 1 = Fix not available 2 = 2D, 3 = 3D,
xx	ID (PRN) numbers of GPS satellites used in solution
p.p	PDOP
h.h	HDOP
v.v	VDOP
*hh	Check sum
<CR><LF>	End

Ex:$GPGSA,A,3,06,10,15,16,21,25,30,,,,,,2.1,1.2,1.8*38

$GPGSV,n,m,ss,xx,ee,aaa,cn,…… ,xx,ee,aaa,cn*hh<CR><LF>

n	Total number of messages, 1 to 3
m	Message number, 1 to 3
ss	Total number of satellites in view
xx	Satellite ID (PRN) number
ee	Satellite elevation, degrees 90 max
aaa	Satellite azimuth, degrees True, 000 to 359
cn	Signal-to-noise rations (C/No) 00~60 dB-Hz. Value of zero means that the satellite is predicted to be on the visible sky but it isn't being tracked.
*hh	Check sum
<CR><LF>	End

Ex:
$GPGSV,4,1,14,03,66,207,50,08,09,322,44,11,01,266,42,14,00,155,00*79
$GPGSV,4,2,14,15,41,088,48,17,21,083,44,18,57,087,51,21,57,173,50*78
$GPGSV,4,3,14,22,05,203,00,23,52,074,49,26,17,028,44,27,00,300,00*79
$GPGSV,4,4,14,28,32,243,00,31,48,286,00*70

$GPRMC,hhmmss.dd,S,xxmm.dddd,<N|S>,yyymm.dddd,<E|W>,s.s,h.h,ddmmyy,d.d,<E|W>,M*hh<CR><LF>

hhmmss.dd	UTC time of the fix. hh = hours. mm = minutes. ss = seconds. dd = decimal part of seconds.
S	Status indicator A = valid V = invalid
xxmm.dddd	Latitude coordinate. xx = degrees. mm = minutes. dddd = decimal part of minutes.
<N/S>	Character denothing either N = North or S =South.
yyymm.dddd	Longitude coordinate. yyy = degrees. mm = minutes. dddd = decimal part of minutes.
<E/W>	Character denothing either E = East or W = West.
s.s	Speed in knots.
h.h	Heading.
ddmmyy	UTC Date of the fix. dd = day of month mm = month yy = year
d.d	Magnetic variation in degrees, i.e. difference between geometrical and magnetic north direction.
<E|W>	Letter denothing direction of magnetic variation. Either E = East or W = West.
M	Mode indicator A=autonomous N=data not valid
*hh	Check sum
<CR><LF>	End

$GPRMC,095035.91,A,6016.3066,N,02458.3832,E,1.08,210.6,131204,6.1,E,A*0A

$GPGLL,xxmm.dddd,<N|S>,yyymm.dddd,<E|W>,hhmmss.dd,S,M*hh<CR><LF>

xxmm.dddd	Latitude coordinate. xx = degrees. mm = minutes. dddd = decimal part of minutes.
<N|S>	Character denothing either N = North or S =South.
yyymm.dddd	Longitude coordinate. yyy = degrees. mm = minutes. dddd = decimal part of minutes.
<E|W>	Character denothing either E = East or W = West.
hhmmss.dd	UTC time of the fix. hh = hours. mm = minutes. ss = seconds. dd = decimal part of seconds.
S	Status indicator A = valid V = invalid
M	Mode indicator A=autonomous N=data not valid
*hh	Check sum
<CR><LF>	End

Ex:$GPGLL,6016.3073,N,02458.3817,E,090110.10,A,A*61

$GPVTG,h.h,T,m.m,M,s.s,N,s.s,K,M*hh<CR><LF>

h.h	Heading in degrees.
T	Letter 'T' denoting True heading in degrees.
m.m	Magnetic heading in degrees.
M	Letter 'M' denoting Magnetic heading in degrees.
s.s	Speed in knots.
N	Letter 'N' denoting speed in knots.
s.s	Speed, km/h.
K	Letter 'K' denoting speed in km/h.
M	Mode indicator A=autonomous N=data not valid
*hh	Check sum
<CR><LF>	End

Ex:
$GPVTG,202.6,T,208.7,M,0.38,N,0.7,K,A*0D

$GPZDA,hhmmss.dd,dd,mm,yyyy,xx,yy*hh

hhmmss.dd	UTC time of the fix. hh = hours. mm = minutes. ss = seconds. dd = decimal part of seconds.
dd	UTC day of month
mm	UTC month
yyyy	UTC year
xx	Local zone hours. Not implemented, output always 00.
yy	Local zone minutes. Not implemented, output always 00.
*hh	Check sum
<CR><LF>	End

Ex.
$GPZDA,061724.46,17,04,2003,00,00*61

Part 9 Trouble shooting guide

- The GPS signal will become weak under the following conditions
- If the vehicle enters the tunnel.The GPS signal transmits linearly down to earth and its signal is blocked out in this situation.
- GPS satellite coverage gets poor because of high-rise building or thick forest. Even though WBT-100 can receive reflected weak GSP signal , the data might be less accurate
- The sun shade in the vehicle can partially block out GPS signal and effect good reception. The GPS satellite is under control of USA and the accuracy might vary depending on some special purpose(as may be required by USA)
- It is a normal situation when GPS data displayed by the receiver device shows a big difference from real position because of unstable atmospheric condition which causes GPS axis to drift from actual map axis occasionally
- Some navigation softwares can only decode latitude/latitude from NMEA0183 provided by logger. No altitude information is available and therefore it cannot define vehicle's positioin whether the is over or under the bridge.
- After successful positioning of WBT-100, if it is moved to another area of 500 km away it cannot be easily re-positioned. This is because the firstly recorded data(position, time and number of satellites acquisitioned) is different from the new area. It will need longer time for re-positioning.
- When the power LED flashes red, the battery is critically low and needs re-charging. If it is not recharged within 30 min, GPS will stop to work to prevent total exhaust of power.
- PIN code will be requested after Bluetooth connection initiates between GPS and PDA. Enter code as 0000.
- Bluetooth connection takes 5 sec for self-check. Each time the device is switched on, it needs 5 sec before connection
- It is normal if the Bluetooth coverage might become short sometimes due to environmental interferences.
- Avoid placing 2 GPS devices too close during positioning.
- USB driver must be installed first before connecting the device to the USB port of computer. Make sure of the right COM PORT being used.
- If disconnection between PDA and GPS is done in a normal way, PDA will halt. Try to disconnect Bluetooth connection in a standard method.
- If the WBT-100 is found to work abnormally because of wrong procedure, reset it by taking off the battery. It will have factory default without effecting pre-set program. At the factory default, GPS reception begins in a quick start mode and its position may take longer time.
- If USB cable will be used for the connection of WBT-100 and PC, install the USB driver first on the PC and make sure of right COM PORT.
- If WBT-100 is used for navigation but found unworkable after connection is done. Make sure that the software NMEA0183 is used. Then use G-tool(Refer to the G-Tool operation guide)
- If the compass direction is not accurate, re-calibrate the WBT-100. Follow the calibration procedure.